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NORTH PACIFIC OCEAN

By WILLIS E. HURD

A considerable change took place in the alinement of average atmospheric pressure over the North Pacific since December. The Aleutian cyclone moved westward¹ out of the Gulf of Alaska early in the month, and to some extent filled in, the center being situated in January over the middle Aleutians and the eastern part of Bering Sea, pressure at Dutch Harbor and St. Paul, 29.50 inches, both of which readings were below the normal. The period of the cyclone's greatest activity was from the 3d to the 8th. At Kodiak the average pressure was nearly 0.70 inch higher than in December, and 0.30 inch above the normal; hence the station this month, instead of being as usual within the cyclone's central area, was far on its eastern border. Low pressure on several occasions extended abnormally far southward in middle longitudes, but such activity was not attended by increased windiness in low latitudes.

The Pacific-California anticyclone was much disturbed on its western side by the incursions of cyclones from the west and north, but on its eastern side—from the coast to several hundred miles at sea—it was generally stable, and high pressures prevailed over most of the Gulf of Alaska and adjacent northeastern waters of the Pacific.

In Asiatic waters high pressure persisted for a good part of the month, and the northeast monsoon was accordingly brisk to strong on the China coast.

Pressure data for several island and mainland coast stations in west longitudes are given in the following table:

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level at indicated hours, North Pacific Ocean and adjacent waters, January, 1929

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	<i>Inches</i>	<i>Inch</i>	<i>Inches</i>		<i>Inches</i>	
Point Barrow ¹	30.40		31.40	28th.....	29.68	16th.
Dutch Harbor ¹	29.50	-0.14	30.24	19th.....	28.72	5th.
St. Paul ^{1,2}	29.50	-0.19	30.10	19th ³	28.62	4th.
Kodiak ^{1,2}	29.94	+0.30	30.50	19th.....	29.16	6th.
Midway Island ¹	29.92	-0.08	30.22	22d.....	29.42	25th.
Honolulu ¹	29.94	-0.06	30.11	31st.....	29.77	18th.
Juneau ¹	30.13	+0.25	30.67	27th.....	29.61	24th.
Tatoosh Island ^{1,2}	30.06	+0.12	30.50	9th.....	29.48	18th.
San Francisco ^{1,2}	30.08	-0.01	30.37	10th.....	29.66	16th.
San Diego ^{1,2}	30.03	-0.03	30.23	22d.....	29.66	16th.

¹ P. m. observations only.² For 30 days.³ Also on 20th.⁴ A. m. and p. m. observations.⁵ Corrected to 24-hour mean.

As was said in the previous REVIEW, December, 1928, was the stormiest month in recent years on the North Pacific, dangerous gales blowing until the 31st, or with forces 11 to 12, according to complete reports, on 12 days of the month. Much abatement in storm energy followed in January. Although gales of force 8 or upward were of almost daily occurrence over the ocean as a whole, yet on only two days, according to present information, did they acquire full storm to hurricane severity. These days were the 21st and 29th, and the forces of 12 occurred within the area bounded by parallels 45° and 50° N., meridians 160° and 170° E., in connection with intense

cyclones operating between Japan and the western Aleutians. In this general region the lowest pressures of the month, about 28.20 inches, were read on the 1st, 2d, and 29th. Continental cyclones of some severity were active over Japanese waters during early and middle days of the month, and caused strong to whole gales, with snow and sleet, especially on the 1st to 3d, over much of the northern and middle steamer routes west of the one hundred and sixtieth meridian of east longitude. The region of most frequently stormy January weather was bounded by latitudes 25° to 50° N., longitudes 145° to 170° E.; in its northeastern part, the sea was gale swept on fully 25 to 30 per cent of the days. In middle longitudes scattered gales occurred between the thirtieth and fiftieth parallels, being slightly most frequent along the northern route. Over the more settled region of the Pacific-California HIGH, and generally between the one hundred and sixtieth meridian of west longitude and the American coast, gales were rather infrequent and rarely exceeded nine in force.

Northers occurred in or near the Gulf of Tehuantepec on the 1st, 6th, and 29th. Those of the 6th attained the force of a whole gale.

At Honolulu the prevailing direction of the wind was from the northeast, blowing from that direction 40 per cent of the time; from the east, 36 per cent. The maximum velocity for the month was at the rate of 29 miles an hour from the northeast on the 22d. On this date and the 23d fresh to strong gales were encountered along the lower stretch of the California-Hawaiian route.

Fog occurrence changed but little from that of December, except that it was reported in January in east longitudes, where it was absent the previous month. Over a large area east of Japan it was observed in connection with sleet and snow during the prevalence of the cyclone of the 1st to 3d. Fog was reported on the 13th and 14th off the east coast of China, and on the 10th, 18th, and 20th in the Gulf of Tehuantepec. There were scattered occurrences off the California coast, where it was most widespread on the 1st, but the principal fog area lay along the upper steamer route in west longitudes, where it formed on about 20 per cent of the days.

TYPHOONS AND DEPRESSIONS—SOUTHERN PART OF THE PHILIPPINES VISITED BY TWO DEPRESSIONS AT THE BEGINNING OF 1929

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[Weather Bureau, Manila, P. I.]

It happens very seldom that the Philippines are visited by more than one depression during the month of January. This year we had two, although, while in the Philippines, they were of no great intensity, and no damage was done, except by heavy rains and consequent floods. These floods were rather extraordinary in Butuan, Mindanao, during the second depression on January 23.

Owing to lack of sufficient observations from the Pacific east of Mindanao, we can not ascertain whether these two depressions were real typhoons before they struck the Philippines. The first of them was shown by our weather map of 6 a. m. January 5, about 300 miles to the south of Yap, near 5° latitude N., between 137° and 138° longitude E. It moved practically to W. on the 5th and 6th; to NW. and NNW. on the 7th and 8th; and inclined again westward on the 9th. On the 10th and 11th it was shown as a shallow depression over the southern Visayas moving SW. and WSW. It filled up on the 12th over the Sulu Sea.

¹ It is preferred to think of this apparent westward movement as being due to rising pressure immediately to the eastward of the usual geographic center of the Aleutian low and that the center of the low is thereby displaced to the westward. It is interesting to note that in this month the change to higher mean pressure was apparently world-wide being especially pronounced over northwestern Europe—Editor.

The approximate positions of the center at 6 a. m. of the 5th, 7th, 9th and 10th were as follows:

January 5, 6 a. m., 137° 30' longitude E., 5° 00' latitude N.

January 7, 6 a. m., 132° 10' longitude E., 5° 20' latitude N.

January 9, 6 a. m., 129° 30' longitude E., 9° 25' latitude N.

January 10, 6 a. m., 125° 15' longitude E., 10° 25' latitude N.

The second depression appeared on the 17th and 18th far to the SSE. and S. of Yap, near 3° latitude N. It moved slowly to N. or NNW. on the 18th, and WNW. on the 19th. Then from the 20th to 24th it moved W. by N., traversing northeastern Mindanao near Surigao,

and the southern part of the Visayas on the 23d. At the time we are writing these notes the center is still shown over the China Sea west of northern Palawan moving westward.

The approximate positions of the center at 6 a. m. of the 20th to 24th were:

January 20, 6 a. m., 136° 45' longitude E., 7° 05' latitude N.

January 21, 6 a. m., 134° 30' longitude E., 7° 50' latitude N.

January 22, 6 a. m., 130° 30' longitude E., 8° 30' latitude N.

January 23, 6 a. m., 124° 45' longitude E., 9° 35' latitude N.

January 24, 6 a. m., 121° 45' longitude E., 10° 10' latitude N.

CLIMATOLOGICAL TABLES

DESCRIPTION OF TABLES AND CHARTS

Table 1 gives the data ordinarily needed for climatological studies for about 180 Weather Bureau stations making simultaneous observations at 8 a. m. and 8 p. m. daily, seventh-fifth meridian time, and for about 34 others making only one observation. The altitudes of the instruments above ground are also given.

Beginning January 1, 1928, movement and velocity of the wind are printed as recorded by the 3-cup anemometer which has replaced the 4-cup pattern.

Table 2 gives, for about 37 stations of the Canadian Meteorological Service, the means of pressure and temperature, total precipitation, depth of snowfall and the respective departures from normal values except in the case of snowfall. The sea-level pressures have been computed according to the method described by Prof. F. H. Bigelow in the REVIEW of January, 1902, 30:13-16.

CHART I.—*Temperature departures*.—This chart presents the departures of the monthly mean surface temperatures from the monthly normals. The shaded portions of the chart indicate areas of positive departures and unshaded portions indicate areas of negative departures. Generalized lines connect places having approximately equal departures of like sign. This chart of monthly surface temperature departures in the United States was first published in the MONTHLY WEATHER REVIEW for July, 1909, but smaller charts appear in W. B. Bulletin U for 1873 to June, 1909, inclusive.

CHART II.—*Tracks of centers of ANTICYCLONES*; and

CHART III.—*Tracks of centers of CYCLONES*. The Roman numerals show the chronological order of the centers. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the observations at 8 a. m. and 8 p. m., seventh-fifth meridian time. Within each circle is also given (Chart II), the last three figures of the highest barometric reading, or (Chart III) the lowest reading reported at or near the center at that time, in both cases as reduced to sea level and standard gravity. The inset map of Chart II shows the departure of monthly mean pressure from normal and the inset of Chart III shows the change in mean pressure from the preceding month.

CHART IV.—*Percentage of clear sky between sunrise and sunset*.—The average cloudiness at each Weather Bureau

station is determined by numerous personal observations between sunrise and sunset. The difference between the observed cloudiness and 100 is assumed to represent the percentage of clear sky, and the values thus obtained are the basis of this chart. The chart does not relate to the nighttime.

CHART V.—*Total precipitation*.—The scales of shading with appropriate lines show the distribution of the monthly precipitation according to reports from both regular and cooperative observers. The inset on this chart shows the departure of the monthly totals from the corresponding normals.

CHART VI.—*Isobars at sea level, average surface temperatures, and prevailing wind directions*.—The pressures have been reduced to sea-level and standard gravity by the method described by Prof. Frank H. Bigelow in the REVIEW for January, 1902, 30:13-16. The pressures have also been reduced to the mean of the 24 hours by the application of a suitable correction to the mean of 8 a. m. and 8 p. m. readings at stations taking two observations daily, and to the 8 a. m. or the 8 p. m. observation, respectively, at stations taking but a single observation. The diurnal corrections so applied will be found in the Annual Report of the Chief of the Weather Bureau, 1900-1901, volume 2, Table 27, pages 140-164.

The sea-level temperatures are now omitted and average surface temperatures substituted. The isotherms can not be drawn in such detail as might be desired, for data from only the regular Weather Bureau stations are used.

The prevailing wind directions are determined from hourly observations at the great majority of the stations. A few stations determine their prevailing directions from the daily or twice-daily observations only.

CHART VII.—*Total snowfall*.—This is based on the reports from regular and cooperative observers and shows the depth in inches of the snowfall during the month. In general, the depth is shown by lines inclosing areas of equal snowfall, but in special cases figures also are given. This chart is published only when the snowfall is sufficiently extensive to justify its preparation. The inset of this chart, when included, shows the depth of snow on the ground at the end of the month.

CHARTS VIII, IX, etc.—*North Atlantic Weather maps of particular days*.